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ARCTIC RESEARCH AND POLICY ACT OF 1981

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Mr. ROTH, from the Committee on Governmental Affairs, submitted the following

REPORT

[To accompany S. 1562]

The Committee on Governmental Affairs, to which was referred the bill (S. 1562) to provide comprehensive national policy dealing with national needs and objectives in the Arctic, having considered the same, reports favorably thereon with an amendment in the nature of a substitute and recommends that the bill as amended do pass.

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Purpose of the Act

The Arctic Research and Policy Act of 1982 establishes administrative mechanisms to create and implement a comprehensive national Arctic research policy. This establishes an Arctic Science and Policy Council and an Arctic Research Commission to promite Arctic Research; sets up a centralized system for collection and retrieval of scientific data with respect to the Arctic; and provides financial support for basic and applied Arctic research.

II. Background and Need

A. SUMMARY

The Arctic has received increasing attention over the past few years. The discovery of vast amounts of energy and mineral resources and the concurrent need to develop these resources quickly, yet with a minimal impact on the land and its residents, accounts for much of this attention. Additionally, the Arctic represents our only common border with the Soviet Union. Agricultural scientists are concerned with the Arctic because the polar air mass has a significant effect on global climate and weather patterns. As attention has grown, one fact has become clear: there is a surprising lack of scientific data on which to base decisions with immense financial and environmental consequences.

There are approximately 15 Federal agencies currently conducting some form of Arctic research, as well as State agencies, universities, private industry and local governments. Surprisingly, there is very little communication among these groups, and consequently there is a long history of duplicative and unnecessary research. Meanwhile, other areas in which research is badly needed are neglected. A corollary problem is that Arctic scientific data is collected in widely diverse places and is often difficult to obtain.

The Arctic will become even more important to the United States in the decades ahead. Energy industry experts have predicted that as much as half of our Nation's future domestic oil supplies will come from Alaska and its offshore fields. The Federal Government must share in the responsibility of ensuring that this development is undertaken in a reasonable, responsible manner that minimizes environmental disruption and the impacts of development on Arctic residents,

particularly the indigenous Native people who depend on the Arctic ecosystem for much of their subsistence needs.

In addition, there is new scientific evidence showing increasing concentrations of atmospheric carbon dioxide from the burning of fossil fuels worldwide and the presence of industrial pollutants from northern Europe and the Soviet Union in the high Arctic. These findings have caused concern that a "greenhouse effect" might raise global temperatures enough to partially melt the polar ice caps, change sea levels and create deserts out of currently producing agricultural areas. Another possibility is that the presence of carbon dioxide and other pollutants could trigger a global cooling trend which could conceivably begin a new ice age. In either case, increased research in the high Arctic will be necessary, and international cooperation will be essential in solving this problem.

Since the Arctic represents our only common border with the Soviet Union, defense-related research is critical. Research into geophysics, commercial fisheries, health and human adaptation, marine technology, agricultural production and biology is also needed. Specific research needs are listed later in this report.

This Act is not an attempt to create a new "super agency" to dictate to Federal agencies what their scientific research goals in the Arctic should be. On the contrary, existing agencies should greatly benefit from the centralization of research data. The Act is also not a substitute for the funding of existing research projects underway in the Arctic. The purpose of this Act is to fund currently neglected areas of research essential to the Nation's needs that might not lie solely within the purview of any Federal agency. The Act is also not an attempt to conduct State research under a Federal aegis: National needs and interests are the focus of the Act. However, since there is some spillover benefit to the State of Alaska, it was felt that the State should contribute to the Arctic Research Fund created by the Act in return for a proportional degree of policy input.

The Committee received overwhelmingly favorable testimony representing the views of Federal, State, and local governmental agencies, private industry, Native interests, academia, environmental protection groups and individuals. In sum, 37 agencies, corporations, groups, or individuals submitted oral and/or written testimony.

It is clear that a wide variety of national and international interests will be affected by what occurs in the Arctic in the coming decades. From the standpoint of energy resources, the Arctic may well contain immense quantities of oil and gas for the 21st century. In terms of fisheries resources, the Arctic will continue to provide protein for millions.

It has been observed that the United States is not "planning" society. Too often, emerging national needs are met by ad hoc efforts, and new research is undertaken with every new effort. Duplication and inefficiency, with their associated costs to society and the taxpayer, are the result. This has been the case in the U.S. Arctic. This duplication, inefficiency, and uncertainty should not be allowed to continue. This legislation is designed to implement a cooperative and comprehensive Arctic planning policy.

B. HISTORY OF THE EFFORTS TO CREATE A NATIONAL ARCTIC RESEARCH POLICY

Congress attention was first directed toward the lack of a comprehensive national Arctic research policy in the 1960's when E. L. "Bob" Bartlett, a Senator from Alaska and a member of the Senate Appropriations Committee, noted a disparity between the funding of Antarctic projects and Arctic projects. Senator Bartlett reasoned that since the United States was an Arctic-rim nation, Arctic research should be given the same or greater attention as research in the Antarctic. Ironically, there is a U.S. scientific Antarctic mandated by administrative action (OMB Circular A–51). All administrative attempts to create and implement an Arctic science policy have failed. After a 3-year effort, a U.S. policy statement agreed to by all concerned Federal agencies was never approved by President Johnson.

That same year, at the request of the Department of State, the Office of Science and Technology, and the Federal Council of Science and Technology, the Interagency Arctic Research Coordinating Committee (IARCC) was established to ensure the sound development and coordination of Federal research programs in the Arctic. In the absence of a guiding research policy, the IARCC foundered and was disbanded in 1978.

In 1977 the Inuit Circumpolar Conference was formed by indigenous peoples of Greenland, Canada, and Alaska to focus on the need for cooperative Arctic policy. The ICC passed a resolution to urge all of their governments to begin developing balanced Arctic policy measures. Their efforts have continued up to the present time.

In 1971, the National Security Council adopted NSD Memorandum 144 which created an Interagency Arctic Policy Group to develop a coordinated plan for scientific research in the Arctic. This memorandum was reaffirmed by NSD Memorandum 202 in 1973. Despite the fact that these instruments mandated the creation of an Arctic research policy, no such policy exists today. As *The Study of United States Arctic Research Policy* (mandated by Section 1007 of Public Law 96–487, the Alaska National Interest Lands Conservation Act) states on page 9:

> NSDM's 144 and 202 definately stated a U.S. desire to develop a coordinated plan for Arctic research, but investigation shows that the intentions of the memoranda have never been implemented to define mechanisms for the funding and management of Arctic research * * * the United States lacks an explicit Arctic research policy and, therefore, does not have a tightly coordinated Arctic research program.

The most recent administrative attempts to create an Arctic research policy have also failed. The Interagency Arctic Policy Group (IAPG), drafted an Arctic Study Report which might have become the foundation of a comprehensive Arctic policy. In January 1982, disagreements between the IAPG agency-members stiffled the issuance of the Final Report. Senator Murkowski of Alaska introduced S. 1562 on July 31, 1981. The measure was initially cosponsored by Senator Stevens of Alaska and Senator Jackson of Washington. S. 1562 was later cosponsored by Senator Gorton of Washington.

C. SCIENTIFIC RESEARCH NEEDS IN THE ARCTIC

At the request of the Senate Committee on Governmental Affairs, the Office of Technology Assessment prepared a series of staff discussion papers designed to identify key research needs. Additionally, the General Accounting Office Report on the development of Alaskan Energy Resources, which is discussed more fully later in this report, identified other research needs. Finally, hearing testimony and other materials submitted for the record indicated topics for research.

The degree of Federal responsibility to participate in the conduct of the research mentioned below varies. Clearly, the private sector, State and local governments, Alaska Native Corporations and Associations, and Colleges, Universities, and Research Institutes conduct a great deal of this research and should continue to be involved. This list is not all-inclusive and only illustrates the range of Arctic research needs.

The Committee does not intend, by including this list, to suggest that all of these research topics must be a part of any Arctic research agenda nor to imply that more research in any areas listed must be conducted. Rather, the list is included to indicate the breadth of research which is being, or may be, conducted and which should be better coordinated as provided under the legislation.

1. Research needs related to offshore oil and natural gas development

There have been numerous studies identifying research needs for the development of offshore Arctic resources, including those of the Polar Research Board, the Marine Board and the Marine Transportation Research Board; all of the National Academy of Sciences. These studies have been undertaken for the Department of Interior, Department of Transportation, and the Department of Energy, among others. The Arctic Research Program of the National Science Foundation has also contributed to the Federal effort. Industry, through the Alaska Oil and Gas Association (AOGA), has sponsored investigations of specific problems. Groups such as the Alaska Eskimo Whaling Commission have conducted environmental investigations.

The Federal role in the past has in part been one of cooperation with industry. Petroleum industry projects have included the use of government laboratories and expert personnel. Some programs which benefit both industry and government have been jointly managed and funded. Policies to encourage future cooperation among government, industry and Arctic residents will help ensure long range commitments to research in the complex Arctic environment.

Continuing study is needed of the engineering properties of sea ice, including single-year, multiyear, and conglomerate ice. The dynamics of the interactions of sea ice with ships and marine structures during wave driven storm conditions are critical, as is the collection of ice keel and ice scour data and analysis of ice-sea floor interaction dynamics. The effects of the force of large ice features, such as pressure ridges, on test structures needs to be better understood through field studies. The Committee wants to emphasize that continuing dialog with the indigenous people of the Arctic, is critical to a complete understanding of Arctic conditions.

Many benefits would accrue from the development, evaluation and acquisition of remote sensors, both aircraft and satellite mounted.

These could provide ice and meteorological data and other information required for navigation, communications, resource development, and environmental monitoring.

More ice breaking research north of the Bering Straits is needed before year-round marine transport can be considered reliable or environmentally acceptable. Both the Coast Guard and industry energy production systems would benefit from this research.

Basic biological research must be done to determine the effect of oil pollution on the food chain, and to test various models for oil clean-up. In addition, sociocultural research into the consequences of resource development on the lifestyle of the residents should be undertaken.

Above are only a few examples of problem areas related to Arctic offshore development. Development is now in very early stages, and as activities expand in the future, research needs will also increase.

2. Research needs related to onshore oil and natural gas development

Although there has been onshore development and production of oil and natural gas, there remain some areas ripe for research. Current resources estimates suffer from limited understanding of the basic geology and geophysics of the Arctic. Continuation of efforts to secure an extensive geological data base, using geophysical and remote sensing techniques, would support a better understanding of geological conditions and would be helpful for future exploration efforts.

The large gas hydrate resources found in the Arctic could greatly extend the production life of the North Slope if economic ways to extract the hydrates from the permafrost could be found without damaging the physical environment. Similarly, research on producing heavy viscous oil would be useful since normal methods of steam drive may damage the permafrost.

Although seismic exploration, the principal method for oil and gas exploration, is used extensively in the Arctic there are still unknowns about the effects of permafrost on the attenuation or distortion of seismic signals. Better understanding of low frequency wave propagation through the frozen ground as a function of temperature and depth of the permafrost is necessary.

3. Research needs related to solid energy fuels

If large scale peat harvesting becomes possible in the Arctic and sub-Arctic regions of Alaska, research will be needed to find ways to avoid damaging the permafrost and tundra in which the peat lies. Peat utilization will require research into gasification solidification and liquefaction technologies particularly suited to the Alaskan environment. Of special interest would be small systems that could be used at the site of use.

Research into synthetic fuel production from the large Arctic coal reserves would also be valuable. Special problems include the effects of large scale water removal to supply steam for the synthetic fuel production, and the effects of large scale heat dissipation (from the process plant) on permafrost regions.

Prior to any large construction of, for example, synfuel plants, or facilities to convert natural gas to methanol, research is needed into the behavior of permafrost, the properties of moisture-laden soil around large structures and the protection of wildlife habitat. Currently, gravel pads and pile foundations are used to support most

structures at Prudhoe Bay. Chemical processing plants there or in the sub-Arctic may have to be set directly in the ground on pilings. The thawing and refreezing of the ground can cause severe problems. Improved research into frozen ground soil mechanics is essential in large construction is to take place in frost sensitive soils.

4. Research needs related to energy conversion

Much of the research appropriate to development of energy conversion and chemical processing is related to construction, water removal, and heat dissipation described earlier. There are other areas of value.

Waste disposal techniques encounter special problems in the Arctic and sub-Arctic. The effects of waste materials on soil composition should be examined. Better monitoring of the air quality in the regions and examination of potential pollutants will be useful in setting air quality criteria. Finally, if a chemical processing industry is set up in Alaska, it will be useful to examine the effect of the cold climate on continuous operation of chemical processes.

5. Research needs related to energy end use and conservation

Research into building techniques and siting in the Arctic and sub-Arctic will be helpful in creating more energy-efficient buildings. Research into building and insulating materials to reduce heat loss in Arctic and sub-Arctic buildings will be of continuing value in temperate regions of the United States as well.

The development of on-site energy systems using peat, coal or other biomass resources will require research into siting, waste disposal, pollution control and transportation on a small scale. Such research has wide applicability to conditions in the 48 contiguous States as well.

6. Research needs related to the development of coal and hard-rock minerals

Since there is currently no large-scale commercial mining underway, little is known about the operational problems and impacts of Arctic and sub-Arctic mining. The only exception is the onshore and offshore extraction of sand and gravel, where additional research is needed on the impacts of removal on the physical environment, Arctic residents, fish and wildlife, and water resources and quality.

Information from pipeline construction and oil and gas activities is useful, but there are important differences between these projects and mining. Additional research is therefore needed. Because Arctic mineral development is not expected to be commercially viable in the near future, the opportunity exists to compile baseline information on climate, wildlife, hydrology, permafrost, and vegetation and to test on a small scale the effects of disturbances similar to those created by large scale operations. The success of mitigation and reclamation efforts can be evaluated before decisions are made about approving commercial-size mines, or regulating their operations.

Analysis of Arctic and sub-Arctic mining operations in other countries should be conducted. Initial Alaskan development projects should be monitored closely and information derived from these experiences shared with prospective developers, local residents, and government agencies.

Government and private efforts in mineral exploration and assessment would benefit from improvements in the application of mineral surveying technologies such as remote sensing, satellite and aerial photography, geochemical analyses, and seismology over large unexplored areas. An inventory of potential mineral resources is necessary for land management. Exploration and mapping activities by government agencies at the current pace could go on for a long time before most of Alaska is surveyed. If more cost-effective and efficient methods were developed, the time and effort required to complete surveying would be reduced.

Each phase in the life of a commercial mining venture has different requirements for access to lands. In exploration, large areas are surveyed to identify promising mineral areas for more intensive examination. During development, personnel and equipment must be brought to the site. During commercial extraction, more personnel, equipment, and supplies may be necessary. Finally, the product must be shipped to processing and marketing facilities. There is a need to develop suitable types of transportation to support each phase of commercial activity.

Expanded access, however, has potential consequences for conservation units (e.g., National Parks, Fish and Wildlife Refuges, etc.), the natural environment, and local communities. Additional work must be done to identify these impacts, their extent, and possible mitigation strategies. This research would assist in selection of access modes best suited to the needs of the mineral developer and to protection of the environment.

In its announcement of planned leasing of offshore areas for mineral development, the Department of the Interior noted that the areas would not be leased before environmental studies were completed. Additional research is required to identify potential impacts of offshore mining, and to identify any special technological requirements for such operations. So far, no significant offshore mining of minerals has occurred in Arctic waters. The importance of the areas for subsistence economic activities, and the possibility of adverse impacts on wildlife and fisheries must remain a top priority for research.

7. Research needs related to the development of Arctic fisheries

Data on Arctic and sub-Arctic ground fisheries has been gathered for a relatively short period of time, and knowledge about them is limited. Consequently, there is a considerable need to continue data collection and analysis for research purposes as well as for determining proper catch allocations. Good information provides a sound basis for understanding population dynamics upon which fishery management decisions can be based.

Research, including data collecting and model building, to obtain projections of optimum yield for long time periods would be valuable. It would provide information to the fishing industry on which to base decisions about capitalization for new vessels and processing facilities. Planning the capital formation and construction of fishing ships takes considerable time. Additional research to enable the Department of Commerce to provide quantitative long range forecasts of allowable catches 2 to 3 years ahead would reduce financial risks and enable industry to make better use of its funds and manpower. In addition,

research into fish processing techniques to prevent deterioration would greatly improve the U.S. fishing industry's operations and economic viability.

Progress has been made in using sonar systems as a management tool for estimating populations of certain species. However, use of sonar for minimizing incidental catch could be better developed. Further research is necessary to reduce the survey costs associated with stock assessment and to improve incidental catch avoidance techniques.

For fish canning, research into inspection procedures and requirements could minimize defective can closure and associated risks. Spectrometric examination techniques might detect certain types of faults. Research is needed to find more effective ways to pinpoint specific batches contaminated in the canning process so that effects on other fishery products can be minimized.

The Committee notes with interest the recent development of commercial halibut fishing in the Bering Sea. Local fishermen landed over 8,000 pounds of halibut in 1982, which made the fishery economically self-sufficient. Fishery ventures of this kind should be encouraged. One way to encourage development is to accumulate basic data about the resource, and about general ocean and climate conditions.

Continued Federal support for science and technology efforts in developing Arctic and sub-Arctic fisheries will help manage a valuable natural resource and benefit an important industry. The coordination of research by industry, the military, local residents and scientists on such topics as offshore energy, oceanography, weather and climate, and engineering in the Arctic environment would benefit fishery development as well. Since Federal science programs are scattered among several agencies, a policy that provides a mechanism to coordinate them would bring savings in many areas.

8. Research needs related to weather, climate, and Arctic pollution

Both short term and long term research is needed to improve understanding of the cause and effect mechanisms of Arctic weather; and more information is required to improve forecasting capabilities. Some types of research problems require multi-nation participation because of the wide expanse of territory involved. Observational programs require improvements in instrumentation. Especially in the far North, remote weather monitoring stations using satellite data transfer are needed to gather information required for improvements in regional weather forecasting. In addition, forecasting techniques for Arctic regions, including the prediction of marine conditions and shoreline storm surges, require development.

There is a need to monitor, survey, and forecast ice conditions, especially the time of Arctic ice break-up. Shipping, fisheries, and resource development industries, the Coast Guard and Arctic residents would all benefit from this effort. Shore located, aircraft mounted. and satellite systems would make up the monitoring system.

The Federal Government, under coordination of the Department of Commerce, now supports several important programs, in cooperation with other countries, with a goal of understanding and predicting global climate. Research in the Arctic region is a key to reaching this goal.

Continuing development of global and regional climate models is required to permit forecasting of climatic changes with scientific con-

fidence. Large scale Arctic meteorological-oceanographic heat balance observation programs are necessary to provide data for these models.

Continuing observation programs are necessary to monitor climate trends (i.e., open water observations for a long period). Polar orbiting satellites equipped with ice measuring sensors and sensors for weather/climate and sea condition measurements could collect data over large areas.

Knowledge concerning the indigenous peoples of the Arctic is a unique science resource that could be developed to better understand all aspects of the climate in the Arctic.

Scientists at the Lawrence Berkeley Labatory have recently discovered that the Arctic is polluted with large concentrations of black soot particles and pollutants which did not originate in the Arctic Some computer models suggest that a catastrophic "greenhouse effect" might occur as a result of these pollutants. The resulting rise in global temperature could, it is speculated, partially melt the polar ice caps, seriously affect the distribution of rainfall and create arid conditions in currently producing agricultural areas. The amelioration of this problem will certainly require international scientific cooperation.

9. Research needs related to human health and habitation in the Arctic

Improving technologies, such as building engineering, is a valuable service to local residents. Information transfer and the adaptation of existing methods are part of the process; so is identifying and implementing small-scale technologies to suit the scattered population.

In the area of basic research, even though much work has been done, additional data about soil properties and mechanics, especially erosion and permafrost, are needed. This information will improve building design and construction and assist in the engineering of roads, airports, and similar facilities. Erosion—the retreat of beaches and banks along the Arctic coast—is a continuing problem. In populated areas, such as Barrow, erosion has been accelerated by the use of coastal deposits for onshore construction (e.g., road and airport fill). Knowledge about tundra erosion is needed as well.

Another topic where basic research would be useful is the particular hydrological properties of the Arctic water cycle. Topics such as the interaction of factors like temperature and flooding need to be explored. For example, the Department of the Interior, in its December 1981 Sec. 1007 ANILCA report, notes that its researchers were unable to sample some streams to determine fisheries potentials because of high water conditions that caused excessive turbulence and turbidity.

In surveying rivers and lakes to identify potential winter water availability and to ascertain the location of hazards such as overflowing ice, Interior Department investigators found that river flows fluctuated widely. A better understanding of the factors contributing to such conditions would be helpful before water treatment plants are installed.

Applied research is critical if technologies are to be appropriately adopted. Especially advantageous are small-scale technologies that address immediate problems. The use of synthetic insulation in place

of gravel for protection of the permafrost under buildings is an example. Another is the substitution of incineration or biodegradation for traditional sewage treatment.

10. Research needs related to Arctic transportation

The needs for transportation research in the Arctic span a broad spectrum. They range from basic questions about the Arctic environment and physical phenomena that affect transportation technology to programs of how to plan and implement specific modes of transportation in support of economic development and human habitation.

Because large areas of the Arctic have not been systematically studied, basic geological and physical information about the region is lacking. For example, data on tides are not available for many parts of the Beaufort Sea. largely because there are so few inhabitants along the coast and unmanned data collection equipment has never been installed. Satellite-based mapping and survey equipment has added to the fund of geophysical information, but this needs to be supplemented with on-site, detailed observation before highways, railroads, or port facilities are built. In general, there is little basic information about the land and its climate and ecosystems--information is taken for granted in the lower-48 States.

Another major subject on which information is lacking is how to construct roads, rail lines, or pipelines without damage to the permafrost and tundra. Not enough is known about the peculiar soil mechanics, thaw stability, and freeze properties of the Arctic lands and about the behavior of construction materials in this environment. Research is needed as well on the long-term performance of roadways.

Without this basic knowledge, the development of surface transportation infrastructure could be unsuccessful, unduly costly, or damaging to the Arctic ecosystem. Similar risks would be encountered in any attempt to make extensive use of land vehicles that do not require a road bed, since they may be even more destructive of soil and vegetation.

What information is available on the Arctic environment is not always adequately disseminated among those seeking to apply transportation technology in Alaska. Information exchange among countries sharing the northern polar regions (Canada, Scandinavia, the Soviet Union) is not extensive. Research and applications carried out in these countries would be put to use in Alaska if there were a clearinghouse for sharing information.

Research needs for Arctic marine transportation must take into account the need for environmental protection. For example, field data needed on the size and occurrence of pressure ridges and associated ice keels and on the mechanics and statics of ocean floor ice scouring. The nature and strength of various types of multi-year ice are not well known and the ice impact forces on ships moving through stormy, ice-filled waters need extensive study. Other research topics include methods of reducing icing on ships in Artic waters, and large-scale modeling techniques for ships operating in ice containing pressure ridges.

The practicality of transporting crude oil by pipeline in the Arctic has been demonstrated by the Trans-Alaska Pipeline. Research needs, however, will arise when future pipelines are considered. One critical area is understanding the thaw stability of the soil down to

depths of about 50 feet. This knowledge would assist future pipeline construction, and would be useful for large construction projects. Proposed pipeline routes traverse all the known physiographic provinces of the Arctic. Continued study of these regions is necessary to support pipeline design and construction. Of special importance are the effects of pipeline river crossings on fish movement and of aboveground pipelines on the migration patterns of wildlife.

Extraction of coal will require hauling facilities to move coal to ports. New road or rail construction will, like pipelines, need data concerning biological patterns and soil mechanics. Again, continued generic research about the wetlands and tundra would benefit all efforts to expand transportation systems.

11. Research needs related to national defense

The United States has never fought a war in the Arctic, or under Arctic conditions. Our principal potential adversary, the Soviet Union, has not only won wars in the Arctic, but has won them because of Arctic conditions. Testimony in the hearings before the Committee underscored the lack of defense-related research currently underway in the Arctic.

Research may need to be conducted concerning the performance of "smart" weapons under ice-fog conditions or intense aurora display, the effects of high latitude space disturbances on orbital or over-the-horizon surveillances, the effects of snow and permafrost on seismic and acoustic vehicle and personnel detection devices, the construction of underground command posts and power plants in permafrost areas, the protection of pipeline installations from terrorist attack or seizure, auroral effects on military space systems, the effects of high altitude nuclear detonation in auroral regions, and, in general, research related to the defense of the U.S. Arctic.

12. Arctic research needs related to agriculture

The Office of Technology Assessment published "Impacts of Technology on U.S. Cropland and Rangeland Productivity" in August, 1982. That report states that 18.5 million acres of Alaska land are suitable for agricultural production. In addition, there are 100 million acres of tundra suitable for reindeer grazing that are currently unused. These facts only begin to convey the potential for Arctic land to support grain production and to produce high-quality protein.

The technologies that will permit development of Alaska's agricultural potential may also be applicable to agricultural problems in more temperate zones, particularly northern tier states of the continental United States.

D. ARCTIC RESEARCH IN THE SOVIET UNION AND OTHER ARCTIC RIM NATIONS

Testimony presented at the hearings on S. 1562 pointed to the fact that the United States is behind other Arctic-rim nations in most aspects of scientific research in the Arctic. The Soviet Union, for instance, employs 20,000–25,000 scientists in Arctic research initiatives. This massive Soviet effort involves many institutions. No less than 170 Soviet scientific institutes are now involved in research related to offshore energy deposits. Of course, since the Soviet Union has no

"private sector," these comparisons cannot be made directly, but they make clear the vast scope of Soviet research efforts in the region.

Testimony was also received by the Committee which pointed out the lack of U.S. ice-strengthened research vessels. Since the Arctic is a largely ocean-covered region, ice-strengthened research vessels are crucial to the conduct of Arctic Research. The Soviet Union has over 20 ice-strengthened research vessels. Canada has more than nine; Norway, more than eight. The United States has one, which is used mainly in the Antarctic. This comparison illustrates the relative strengths of the research programs of Arctic-rim nations.

E. PRINCIPAL ECONOMIC AND COMMERCIAL RESOURCES IN THE ARCTIC

The Federal budgetary impact of this legislation is minimal when compared to the commercial value (and Federal tax revenues) that could accrue as a result of careful development of the Arctic based on well designed research as provided under this bill. The primary commercial resources in the Arctic region (as defined in this act) are mineral and fisheries resources.

1. Mineral resources

According to the National Petroleum Council's Report on Arctic Oil and Gas, released in December 1981, the Arctic contains 24 billion barrels of recoverable but undiscovered oil in addition to 109 trillion cubic feet of natural gas. Other sources have estimated that Alaska contains over one-third of the total U.S. onshore reserves of oil, and almost 60% of total U.S. offshore reserves of oil. Moreover, some estimates of total reserves of natural gas both on and offshore in the Alaskan Arctic range as high as 260 trillion cubic feet.

Although measured coal resources in the Alaskan Arctic are relatively low due to the fact that area has not yet been fully explored, there is a hypothetical geological potential for over 1.5 trillion tons of coal to exist in Alaska north of the Arctic Circle.

High to moderate potential "hard-rock" (metallogenic) mineral deposits extend in a wide band across the Arctic region in Alaska. Gold, silver, lead, zinc, copper, platinum, tin, tungsten, asbestos, chromium, molybdenum, barite, beryllium, and fluourite are known to exist in the region. Preliminary exploration indicates that uranium minerals may exist in the Arctic. The strategic and monetary value of these reserves to the United States is undoubtedly immense.

2. Alaskan fisheries resources

Alaska leads the Nation in the value of fish landings. It provides 25% of the Nation's total value of fish landed. In 1981, Alaska landings were worth $639 million and products were worth about $1.5 billion. Most of these landings occurred in Bristol Bay, one of the Arctic's richest fishing grounds, which lies within the territory covered by this Act.

In addition, Alaska has the largest underutilized fishing resource in the Nation. Of the total 2.6 million metric tons of exploitable fishing resources in the Fisheries Conservation Zone (FCZ) of the United States, 2.0 metric tons lie off Alaska. Only .4 of the 2.0 million metric tons are presently utilized by the U.S. fishing fleet, and for the most

part, this resource lies in the region north of the Aleutian chain that is covered by this Act.

Alaska provides 70% (or about $624 million) of the Nation's export of U.S. fishery products (excluding products from "joint venture" operations with foreign nations). Over half of the Nation's fish exports are salmon products, most of which originate from the Bristol Bay Area, also covered by this Act.

It is difficult to measure the assets that will accrue to the Federal Treasury as a direct and indirect result of the development of Arctic fisheries, but it is certain that they will be substantial.

F. GAO REPORT: "DEVELOPING ALASKA'S ENERGY RESOURCES: ACTIONS NEEDED TO STIMULATE RESEARCH AND IMPROVE WETLANDS PERMIT PROCESSING"

On June 17, 1982, the General Accounting Office issued a report entitled: "Developing Alaska's Energy Resources: Actions Needed To Stimulate Research and Improve Wetlands Permits Processing." The highlights of that Report are as follows:

Additional research is needed to evaluate the impacts of oil and gas-related activity in Alaska as a basis for promoting environmentally sound approaches for future development without unnecessarily increasing its cost.

Congress should provide for three critical elements—coordination, prioritization, and the source of funding—when considering legislation to establish an Arctic research policy.

The Arctic research issue is being addressed in a bill pending before Congress. This bill (S. 1562) seeks to provide a comprehensive research policy to deal with national needs and objectives in the Arctic. GAO concurs that S. 1562 could help provide the basis for filling the gaps in our knowledge of the Arctic.

According to the GAO report the Interior Department has encountered severe difficulties in justifying and implementing many of its Arctic policies and responsibilities because of inadequate, wasteful, duplicative and incomplete research.

GAO concludes that Federal revenues could be enhanced and production possibilities increased with the addition of a broader range of basic scientific data that does not now exist and is not currently being conducted by any agency.

In the Committee's view, this report strengthens the arguments for more effectively planned and implemented Federal research in the Arctic. The Committee believes this legislation represents a timely legislative response to the problems specified in the GAO report.

III. Section-by-Section Summary of the Bill

Section 1

Purpose of the Act is to provide a comprehensive national policy with respect to Arctic research.

Section 2.—Findings of Congress

1. The Arctic is critical to national needs in the areas of defense, commerce and energy.

2. Most Arctic-rim countries have outstripped the United States in Arctic technologies.

3. Research must be done to mitigate the adverse consequences of development on the land and people of the Arctic.

4. Fragmentation of Federal Arctic research has led to the neglect of certain areas of research and to unnecessary duplication of effort in other areas.

5. There is an immediate need to organize and fund neglected scientific research in the Arctic.

6. Research goals should cover all scientific disciplines.

Purposes of the act

1. To establish an Arctic Science Policy Council and an Arctic Research Commission to promote Arctic Research.

2. To set up a center for Arctic science data collection and retrieval.

3. To provide funding for basic and applied scientific research that is currently neglected and essential to our Nation's needs.

Section 3.—Arctic Science Policy Council—Five members with staggered 2-year terms

1. One chairperson appointed by the President.

2. Two people chosen by the President from a list submitted by Governor of Alaska.

3. Two people chosen by the President from a list submitted by Commerce, DOD, Interior, State, DOT, DOE and NSF.

Although the criteria for the selection of the members of the Arctic Science Policy Council is not specified in the Act, the Committee intends that these members should possess the credentials of professional scientists engaged in or familiar with Arctic research and/or individuals with applicable decisionmaking, policymaking, or managerial experience that would be of benefit to the Council in the performance of its duties.

Section 4.—Duties of council

1. To facilitate cooperation between Federal and State governments.

2. To promote international research.

3. To develop an integrated national Arctic science policy.

4. To appoint the Arctic Research Commission.

5. To cooperate with the State of Alaska.

6. To submit an annual report to Congress on past accomplishments and future policy goals.

Section 5

Federal agencies are directed to cooperate with the Council in making research and reports available, and in providing facilities or services under whatever agreement the parties reach.

Section 6.—Arctic Research Commission—Nine members with staggered 4-year terms

1. Four experts in Arctic science.

2. Two Arctic residents.

3. Two members from private industry operating in the Arctic.

4. One Coast Guard representative.

The Committee intends that the interests of the Native peoples of the Arctic should be represented. The Act provides for the inclusion

of two Arctic residents. As the majority of permanent Arctic residents are historically Natives, the opportunity for the representation of those interests most appropriately lies at this level.

Section 7.—Duties of Commission

1. To survey all existing Arctic research to determine priorities for future projects.
2. To set up a scientific data center.
3. To award grants for research necessary to national needs, and consistent with the Council's policy guidelines.
4. To consult with the Council.
5. To cooperate with the State of Alaska.
6. To publish an annual report to the Council describing the past year's accomplishments and making recommendations for future Arctic research.
7. To submit to Congress and the Alaska State Legislature by April 1983 a recommendation on the operation of Government laboratories doing Arctic research.

The Committee is concerned that both scientific research data and information on policy planning be available to those people who are most directly impacted; residents of the Arctic. By making the data center accessible to those interests, and by making the annual Report of the Commission publicly available, the Committee intends that this goal be accomplished.

Section 8

The Commission may hire an Executive Director and whatever staff is necessary; make contracts for goods and services, etc.

Section 9

The State of Alaska may participate in the activities of the Council and Commission if it contributes to the Arctic trust fund an amount equal to ¼ of the previous year's Federal appropriation.

If the State decides not to participate, all appointments which are required to be made from among individuals employed by the State of Alaska, or nominated by the Governor of Alaska, must be vacated.

Section 10.—Arctic Research Fund

Consists of Federal appropriations (up to $25 million a year authorized); and Alaska's contribution.

Section 11.—Definition of "Arctic"

For the purposes of this Act, the Arctic consists of all U.S. and foreign territory north of the Arctic Circle; all U.S. territory north of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas including the Bering, Chukchi, and Beaufort Seas; and the Aleutian Chain.

Section 12.—Nonapplicability of NEPA

This section simply ensures that the Arctic Science Policy Council and the Arctic Research Commission will not have to submit environmental impact statements pursuant to the National Environmental Policy Act of 1969 for any activities conducted pursuant to this Act. It does not, however, provide any special exception for any research conducted pursuant to a grant awarded under this Act from the

NEPA requirements. The only purpose of this section is to ensure that duplicative requirements for environmental impact statements under NEPA are not put on the Council or the Commission, in addition to its grantees.

IV. Legislative History

S. 1562 was introduced by Senator Murkowski for himself and Senators Stevens and Jackson on July 31, 1981. Hearings were first held by the Senate Committee on Governmental Affairs on April 7, 1982 at the University of Alaska at Fairbanks. The witnesses at that hearing were:

Honorable Ruth Burnett, Mayor, City of Fairbanks, Alaska.

Ralph Anderson, Special Assistant to Mayor Eugene Brower, North Slope Borough, Alaska.

Oliver Leavitt, representative of the Arctic Slope Native Regional Corporation.

Max Brewer, Former Director of the Naval Arctic Research Laboratory.

Juan Roederer, Director of the Geophysical Institute, University of Alaska.

David Hickok, Alaska Council on Science and Technology.

Vera Alexander, Institute of Marine Sciences, University of Alaska.

Richard Weaver, representing the Alaska Oil and Gas Association.

William Sackinger, Professor, Geophysical Institute, University of Alaska.

Chuck Hawley, Hawley Associates, Mining Consultants.

On May 19, 1982, a proposed amendment (Senate Amendment #1453) was submitted for printing by Senator Murkowski for himself and Senators Stevens and Jackson. The Amendment was referred to the Senate Committee on Governmental Affairs. On June 17, 1982, a hearing was held by the Senate Committee on Government Affairs in Washington, D.C. The witnesses at that hearing were:

Honorable Terry Miller, Lieutenant Governor of the State of Alaska, accompanied by Mr. James Souby, Director of Division Policy Development and Planning, Office of the Governor, State of Alaska.

Juan Roederer, Director, Geophysical Institute, University of Alaska.

Roger C. Herrera, Exploration Operations Manager, Sohio of Alaska Petroleum Company.

Hans-Pavia Rosing, President, Inuit Circumpolar Conference.

Nancy Yaw Davis, Cultural Dynamics, Ltd.

Additional written testimony was received from

Honorable Casper Weinberger, Secretary, Department of Defense.

Powell A. Moore, Assistant Secretary for Congressional Relations, Department of State.

William Horn, Deputy Undersecretary, Department of the Interior.

R. Tenney Johnson, General Counsel, Department of Energy.

Rear Admiral Norman Venzke, Chief, Office of Operations, United States Coast Guard.

John E. Slaughter, Director, National Science Foundation.

Dr. Shelby Tilfor, Office of Space Sciences and Applications, National Aeronautics and Space Administration.

Douglas L. McCullough, Deputy Director, Energy and Minerals Division, General Accounting Office.

Matthew Iya, Eskimo Walrus Commission, Nome, Alaska.

Walter C. Oechel, Director, Systems Ecology Research Group, San Diego, California.

Charles Johnson, President, Bering Straits Native Corporation, Nome, Alaska.

Pamela Ferris-Olson, Whale Center, Oakland, California.

Honorable Albert P. Adams, Chairman, Committee on Finance, Alaska State Legislature.

Harry J. Longwell, Operations Manager, Production Department, Exxon Company, U.S.A., Houston, Texas

Honorable Eugene Power, Mayor, North Slope Borough, Alaska.

G. T. Wilkinson, Executive Vice President, ARCO Alaska, Anchorage, Alaska.

G. Edgar Folk, Jr., Professor, University of Iowa.

William H. Dubay, Alaska Business Utilities, Anchorage, Alaska.

Don Argetsinger, Vice President, NANA Regional Corporation, Anchorage, Alaska.

William W. Hopkins, Executive Director, Alaska Oil and Gas Association, Anchorage, Alaska.

Harold Sparck, Nunan Kitlutsisti/Protectors of the Land, Fethel, Alaska.

William C. Williams, President, Calista Corporation, Anchorage, Alaska.

R. C. Harchaarek, Ukpeagvik Inupiat Corporation.

On September 13, 1982, Senator Murkowski, on behalf of himself and Senator Stevens, submitted a proposed amendment in the nature of a substitute (Senate Amendment 3271) for printing and referral to the Senate Committee on Governmental Affairs.

V. Committee Rollcall Votes

In compliance with section 133 (b) and (d) of the Legislative Reorganization Act of 1946, as amended, the record of rollcall vote in the Committee during its consideration of S. 1562 is as follows: Vote on whether to favorably report S. 1562, as amended; 13 yeas, zero nays.

YEAS—13	NAYS—0
Mr. Stevens	
Mr. Danforth	
Mr. Cohen	
Mr. Mattingly	
Mr. Rudman	
Mr. Schmitt	
Mr. Eagleton	
Mr. Nunn	
Mr. Chiles	
Mr. Glenn	
Mr. Sasser	
Mr. Pryor	
Mr. Roth	

VI. Estimated Cost of the Legislation

Pursuant to Section 403 of the Congressional Budget Act of 1974, the Congressional Budget Office has reviewed the cost implications of S. 1562. The following is CBO's estimate of the potential cost of this legislation:

U.S. Congress,
Congressional Budget Office,
Washington, D.C., September 30, 1982.

Hon. William V. Roth, Jr.,
Chairman, Committee on Governmental Affairs,
U.S. Senate, Washington, D.C.

Dear Mr. Chairman: Pursuant to Section 403 of the Congressional Budget Act of 1974, the Congressional Budget Office has prepared the attached cost estimate for S. 1562, the Arctic Research and Policy Act of 1982.

Should the Committee so desire, we would be pleased to provide further details on this estimate.

Sincerely,

Alice M. Rivlin,
Director.

Congressional Budget Office—Cost Estimate

1. Bill number: S. 1562.
2. Bill title: Arctic Research and Policy Act of 1982.
3. Bill status: As ordered reported by the Senate Committee on Governmental Affairs, September 20, 1982.
4. Bill purpose: The bill establishes the Arctic Science Policy Council and the Arctic Research Commission to promote Arctic research. The Council is mandated to promote cooperation among federal agencies, and to develop an integrated national Arctic science policy. The Commission is directed to survey Arctic research, determine priorities, establish a data collection and retrieval center, and make grants for Arctic research. The State of Alaska may elect to participate in the activities of the Council and Commission. To participate, Alaska must contribute an amount equal to one-quarter of the appropriation. An Arctic Research Fund is established, to consist of appropriations, contributions from Alaska, and any private contributions, to be used for supporting the activities of the Council and Commission.
5. Cost estimate:

	Millions
Authorization level:	
Fiscal year:	
1983	
1984	$25
1985	25
1986	25
1987	25
Estimated outlays:	
Fiscal year:	
1983	
1984	15
1985	25
1986	25
1987	25

The costs of this bill fall within budget function 250.

In addition to the authorization of federal funds, the State of Alaska may also contribute to the Arctic Research Fund. If Alaska chooses to participate in the Council and Commission, the fund would receive from Florida and have available for expenditure about $6 million annually, in addition to the $25 million authorized.

6. Basis of estimate: It was assumed that the bill would be passed in fiscal year 1983 and that the amounts authorized will be appropriated.

The bill authorizes the appropriation of $25 million for each fiscal year, beginning fiscal year 1984, to the Arctic Research Fund for activities of the Council and Commission. The estimated outlays are based on the spending experience of similar programs.

The estimated cost to Alaska for participating is equal to one-quarter of the appropriation, as required in the bill.

7. Estimate comparison: None.

8. Previous CBO estimate: None.

9. Estimate prepared by: Jeff Nitta.

10. Estimate approved by:

C. G. Nuckols
(For James L. Blum,
Assistant Director for Budget Analysis).

VII. Evaluation of Regulatory Impact

Paragraph 11(b)(1) of Rule XXVI requires each report accompanying a bill to evaluate "the regulatory impact which would be incurred in carrying out the bill."

S. 1562 will not have any direct regulatory impact. It does not authorize any additional regulation of activities in the private sector, impose any new record keeping or reporting requirements on any segment of the public, or abolish any existing regulations.

VIII. Changes in Existing Law

Rule XXVI of the Standing Rules of the Senate requires that changes in existing law made by the bill, as reported, be detailed in the Committee Report accompanying the bill. No changes in existing law are necessitated by S. 1562, as amended.

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